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G1F

(54) Rotary spirit level

(57) A device for use in demonstrating horizontal, vertical, angles of inclination and in general the principles of surveying comprises a circular disc 1 which supports a spirit level 2 and mounted in a recess of a parallelepipedic block 5 with two faces of the block 8,9 parallel to the plane of the disc 1. An angular scale 10 is associated with and centred on the axis of the disc at its central point of rotation and a sighting means 14 or 17 is angularly movable over the scale and an edge of the sighting means extends across a diameter of the scale and an is alignable with the longest axis of the spirit level. The sighting means 17 has outturned ends 23,24 for use in sighting distant objects. A sighting means such as a telescope or hollow tube 14 is also possible.

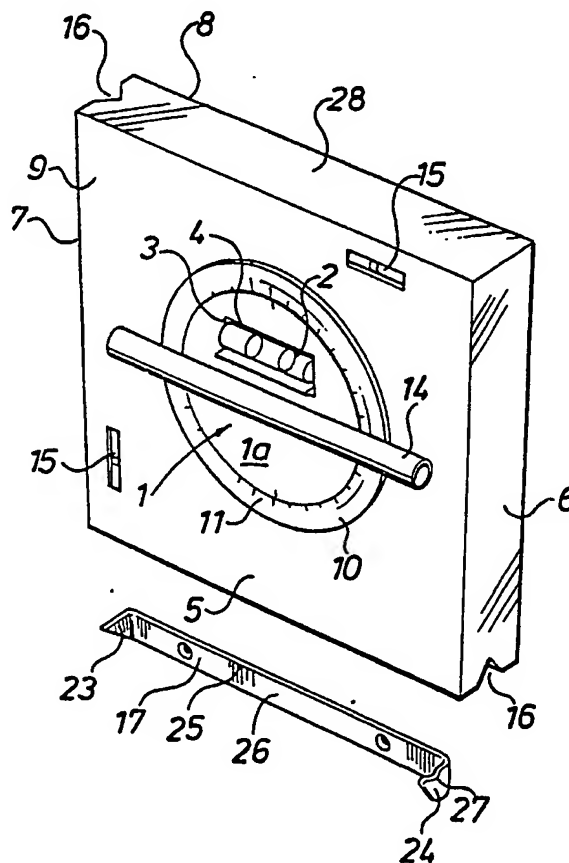


FIG. 1

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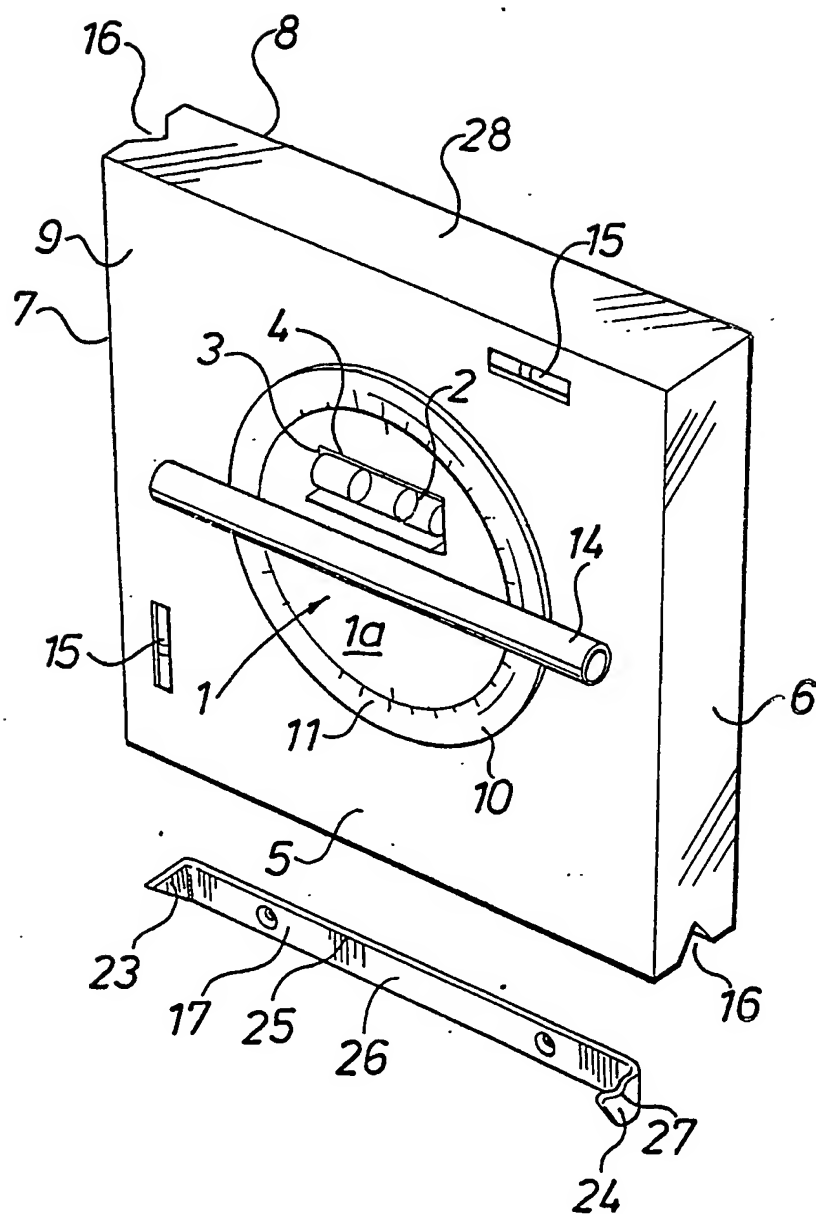


FIG. 1

SPECIFICATION

Rotary spirit level

5 The present invention relates to a device which is primarily for use as a teaching aid to demonstrate horizontal, vertical, angles of inclination, and in general the principles of surveying. The device may also serve to measure altitudes of celestial bodies, sun, moon, etc. in the process of exercises relating to the study of the real and apparent movement of such bodies.

According to one aspect of the present invention there is provided a device comprising a disc its two parallel planes or surfaces concentric to a circular perimeter the same disc being provided with a spirit level so placed as to be projecting from the recess or hollow, and the longer axis of the spirit level being parallel to the side of the disc in which it is contained and thus to be observable, partly with the aid of reflective surfaces in the recess or hollow, from any angle on that side of the disc. Advantageously the disc is mounted in a block which is provided with mutually perpendicular faces, parallel pairs of which extend parallel and perpendicular to the plane of the disc. The block may be provided with a circular central aperture or recess in which the disc is located and the sighting device may be mounted on the block or to the external face of the disc described. The scale may be mounted on a surface of the block concentric to the circular central aperture or recess and of dimensions suitable for it to be fastened to the block while overlapping the disc and retaining it within its recess while permitting it to rotate freely in a plane parallel to the surfaces of the scale.

The sighting device consists of a hollow tube or telescope, with or without glass or clear plastic optical lenses which permit the operator to observe accurately objects viewed through the tube or telescope. Alternatively, a sighting device in the form of a bar may be provided one edge of which extends along a diameter of the scale and which has outturned ends which can be used for sighting a distant object.

Figure 1 is a perspective view of an embodiment of a device according to the present invention.

Figure 2 is an exploded sectional view showing the block, disc and retaining ring on which the scale is mounted of the device of Fig. 1.

The device shown in Figs. 1 and 2 comprises a disc for example of polyurethane foam or a metal such as aluminium or other materials of similar properties, its two flat parallel planes or surfaces concentric to the circular perimeter. The disc has a recess or hollow 3 in one of the flat surfaces 1a in which is provided the spirit level 2 so placed

as to be projecting from the recess 3, the longer axis of the spirit level being parallel to the side 1a of the disc 1 in which it is contained and thus to be observable, partly with the aid of reflective surfaces in the recess or hollow such as mirror or highly reflective or polished surface 4, from any angle on that side of the disc.

The aperture 20 is shown in Fig. 2 in which the disc 1 is received, the disc rotating at 18, a cylindrical aperture of dimensions to receive accurately the cylindrical projection 17 on the side 1b of the disc 1. The aperture 20 is constructed as to permit the rotation of the disc freely within the aperture while of such fitting between the respective surfaces that the disc will maintain a disposed setting at the requirements of the operator. The disc is retained in place by an annular member or ring 10 which is received at the surface of the block 5 at 21 representing a surface concentric to the aperture 20. The disc 1 is stepped at 22 so that the horizontal surfaces of the step rotate inside the ring 10. The ring 10 is adhered or otherwise fixed to the block 5.

An angular scale 11 is provided on the outer face of the ring 10, the scale being centred on the centre of the disc 1.

Sighting means 14 is associated with the disc 1 and scale 11 and comprises a hollow tube or telescope, with or without glass or clear plastic optical lenses, or a bar 17, either to be mounted on the disc to move conformably with the same, being parallel to the longer axis of the spirit level 2 so as to describe a horizontal plane along its, the sighting device's, longer axis when the bubble of the spirit level is exactly central and equidistant from its extremities and indicating a horizontal plane. The bar in Fig. 1 has linear edges 25, 26 of which one edge 25 is aligned with a diameter of the scale 10 and disc 1 so that the edge is coincident with 0° and 180° on the scale when the longer axis of the spirit level is in a perfect horizontal plane and the disc in a vertical plane. Similarly an upper or lower surface of the longer axis of the tube 14 will correspond with the same markings on the same scale in corresponding conditions of the spirit level. Ideally, the bar 17 has outturned ends 23, 24 which can be used for sighting distant objects edge 24 being cut away at 27 for convenience of sighting.

As shown, perpendicular faces of the block may be provided with V-shaped grooves as at 16 and the front face 9 is provided with perpendicularly arranged spirit levels for checking the orientation of the front surface, particularly when disposed in a horizontal plane.

In Fig. 2 two recesses 19a 19b of the block 5 contain captive nuts, these to provide points at which the whole device may be mounted on a tripod or similar stand used in the

activity of surveying, the captive nut at 19a permitting use of the device with the disc in a vertical plane, and that at 19b permitting use of the device with the disc in a horizontal plane.

The above described device can be used in a number of different ways both as a level and for surveying and to demonstrate vertical, horizontal, angles of inclination and the principles of surveying. With the front and back faces 8 and 9 of the block vertical the side faces 6, 7 can be placed on surfaces whose inclination is required to be determined, the disc being rotated until the bubble in the spirit level is central to its container at which point the coincident of sighting device is noted with the scale 10. Where the surface measured departs from exact horizontal or an exact vertical the number of degrees of departure is indicated on the scale. The surfaces may be planar or, for example, rods, which are then engaged in the appropriate groove 16 in the respective side or face. Alternatively with the side faces 7 and 28 horizontal and vertical, the sighting bar can be used in association with the scale alone to determine the elevation of a distant object. It is further possible to create inclination of surfaces to a prescribed number of degrees or pitch measured in degrees, the number of degrees of desired inclination being prefixed by coincidence of sighting device with scale and the surface moved or in an appropriate manner constructed so that the device applied to it registers that the desired inclination has been achieved, the bubble of the spirit level now being at centre. The device may also serve to measure altitudes of celestial bodies, sun, moon, etc., in the process of exercises relating to the study of real and apparent movement of such bodies. Rings may be substituted for or mounted concentric to the angular scale 14, these additional rings to be graduated with other scales. For example, a ring graduated in hours will permit the comparison of scales of time and of arc.

It will be appreciated that, while the above device has been designed as a teaching aid, it may also be used in practice to measure angles of inclination, elevation etc. A telescope or tube with suitable glass can be mounted on the disc permitting the observation of distant features such as a surveyor's graduated staff.

CLAIMS

1. A device being an aid for teaching and/or surveying comprising a disc which supports a spirit level and which can be rotated through 360°, an angular scale associated with the disc, and sighting means angularly movable over the scale and alignable with the long axis of the spirit level.

2. A device as claimed in claim 1, wherein the sighting means has a linear edge which

extends along a diameter of the scale and is alignable with the spirit level as claimed in claim 1, or alternatively a hollow tube or telescope the long edges of which are similarly alignable.

3. A device as claimed in either claim 1 or claim 2, wherein the sighting means is in the form of a bar, one edge of which extends along a diameter of the scale and which has outturned ends which can be used for sighting a distant object.

4. A device as claimed in any one of the preceding claims, wherein the disc is mounted in a block which is provided with a mutually perpendicular faces, parallel pairs of which extend parallel and perpendicular to the plane of the disc.

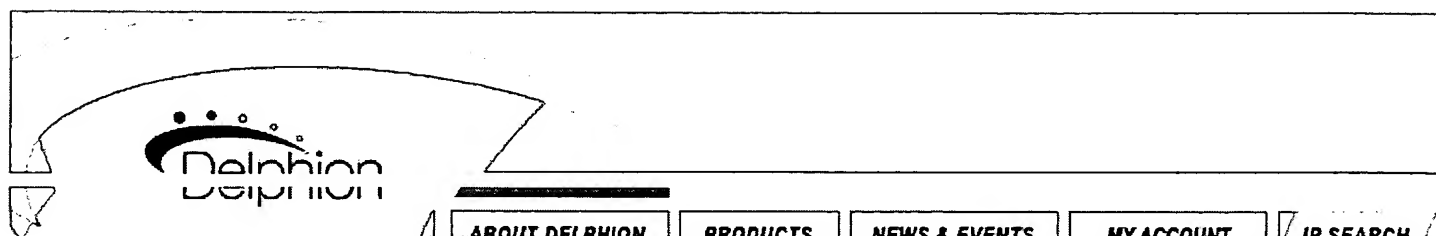
5. A device as claimed in claim 4 wherein the block is provided with a central recess in one face in which the disc is located and the sighting means is mounted on the disc.

6. A device as claimed in claim 5, wherein linear grooves are provided in at least two mutually perpendicular faces of the block, but not excluding horizontal faces of the block, the grooves extending in or parallel to the plane of the disc.

7. A device as claimed in either claim 5 or claim 6, wherein the scale is mounted in a ring which engages the surface of the block concentric to the recess containing the disc and serves to retain the disc in the block, and the sighting means is provided mounted conformably with the disc and to coincide with a diameter of the scale.

8. A device substantially as herein described with reference to the accompanying drawings.

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INPADOC Record

Title: **GB2157433A: ROTARY SPIRIT LEVEL**

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Country: **GB** United Kingdom
Kind: **A** Patent Specification

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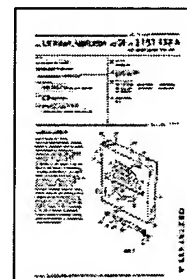
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March 31, 1984	AE	Application data



High Resolution

Low Resolution

5 pages

Family

<u>Patent</u>	<u>Issued</u>	<u>Filed</u>	<u>Title</u>
GB8408381A0	May 10, 1984		
GB2157433A	Oct. 23, 1985	March 31, 1984	ROTARY SPIRIT
2 family members shown above			

Other Abstract Info: none

Foreign References: No patents reference this one



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